Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Wireless Telecommunications Bureau and Office of Engineering and Technology Seek Comment on NextNav Petition for Rulemaking	))))	WT Docket No. 24-240 RM-11989

COMMENTS OF GPS INNOVATION ALLIANCE

The GPS Innovation Alliance ("GPSIA")[1/] submits these comments in response to the Public Notice ("*Public Notice*")[2/] released by the Wireless Telecommunications Bureau ("Bureau") and Office of Engineering and Technology ("OET") in the above-captioned proceeding seeking comment on the petition for rulemaking ("Petition") filed by NextNav Inc. ("NextNav").[3/] NextNav proposes that the Commission reconfigure the 902-928 MHz band (the "Lower 900 MHz band") to enable use of the spectrum for positioning, navigation, and timing ("PNT") services, complementary to GPS.[4/] GPSIA expresses no position on the merits of the Petition, but is pleased to have the opportunity to provide the Bureau and OET with information regarding GPS and the provision of complementary PNT services. While it may be useful for

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[1/] GPSIA is an industry association formed to protect, promote, and enhance the use of the U.S. Global Positioning System ("GPS") and global navigation satellite system technologies. GPSIA includes organizations in the manufacturing, aviation, agriculture, construction, transportation, emergency response, surveying, mapping, and defense industries. GPSIA members and affiliates are drawn from a broad cross-section of the economy and represent a wide variety of fields and businesses whose billions of consumers are reliant on GPS in U.S. and non-U.S. markets. GPSIA seeks to inform policymakers about the centrality of GPS to our nation's economy.

[2/] *Wireless Telecommunications Bureau and Office of Engineering and Technology Seek Comment on NextNav Petition for Rulemaking*, Public Notice, DA 24-776 (rel. Aug. 6, 2024).

[3/] Petition for Rulemaking of NextNav Inc., Enabling Next-Generation Terrestrial Positioning, Navigation, and Timing and 5G: A Plan for the Lower 900 MHz Band (902-928 MHz) (filed Apr. 16, 2024).

[4/] *See* Petition at 1.

the Commission to consider how to authorize complementary PNT systems, the Commission must recognize that GPS is a national asset that cannot be taken for granted. Today it is more ubiquitous than any complementary system and no PNT system can "backup," or replace, GPS.[5/] The Commission must, therefore, continue to safeguard the vitality of GPS, including ensuring that space-to-earth signals remain free from harmful interference.

I. INTRODUCTION

GPS is an integral component of the United States critical infrastructure ecosystem, delivering economic efficiencies and supporting safety-of-life applications. Indeed, GPS has set the standard for PNT services in the U.S. for more than 50 years, driving reduced costs, increased productivity, and the growth of new industries. GPS delivers extremely exact positioning services for precision agriculture, timing services in telecommunications, and navigation services for transportation telematics systems.[6/] First responders rely on GPS to track emergency personnel and to locate individuals experiencing emergencies.[7/] And for the Department of Defense ("DoD"), "GPS-enabled precision strike has altered policy, strategy, doctrine, operations concepts, and weapons systems."[8/] Indeed, GPS has hundreds, if not thousands of use cases, including those for consumers who use smartphones, smart watches, and other devices featuring GPS applications on a daily basis.

[5/] *See* Richard Mason *et al.*, *Analyzing a More Resilient National Positioning, Navigation, and Timing Capability*, RAND at xx (May 17, 2021), https://www.rand.org/pubs/research_reports/RR2970.html.

[6/] *See* Michael P. Gallaher, *Economic Benefits of the Global Positioning System (GPS)*, Presentation at the Positioning, Navigation and Timing Advisory Board Meeting (Nov. 20, 2019), https://www.gps.gov/governance/advisory/ meetings/2019-11/gallaher.pdf.

[7/] *See* Accelerating Emergency Response Times, GPS In Action, GPSIA, www.gpsalliance.org/apps-1 (last visited Aug. 27, 2024).

[8/] Marc J. Berkowitz, *America's Asymmetric Vulnerability to Navigation Warfare: Leadership and Strategic Direction Needed to Mitigate Significant Threats*, NATIONAL SECURITY SPACE ASSOCIATION at 6 (July 18, 2024), https://nssaspace.org/wp-content/uploads/2024/07/NAVWAR-FINAL.pdf.

According to the National Institute of Science and Technology ("NIST"), the economic impact of GPS is $1.4 *trillion*.[9/] Indeed, it is estimated that lack of availability of GPS would have an impact on the U.S. economy of $1 billion per day.[10/]

II. COMMENTS

The Petition is premised on the need for PNT systems that will complement GPS.[11/] In assessing that asserted need, GPSIA urges the Commission to consider and incorporate the work that has already been performed in this area. In particular, Executive Order 13905 required the preparation of PNT profiles so that the public and private sectors can, among other things, identify the assets that depend on PNT services and manage the associated risks to those assets.[12/] In addition, as a complement to Executive Order 13905, the Memorandum on Space Policy, Directive 7 provides policy goals for the United States, which include implementing alternative sources of PNT for critical infrastructure, key resources, and mission-essential functions.[13/] The Government Accountability Office ("GAO") has also issued a report, at the

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[9/] *See* Comments of GPSIA, WT Docket No. 23-232, at 2 (filed Oct. 3, 2023) ("GPSIA Oct. 3, 2023 Comments").

[10/] *See* Alan C. O'Connor *et al.*, *Economic Benefits of the Global Positioning System ("GPS")*, Final Report, NIST, ES-4 (June 2019) ("[L]oss of GPS service would have a $1 billion per day impact…the impacts could be as much as 50% higher" due to "widespread adoption of GPS-enabled precision agriculture technologies by the American farmer."), https://www.nist.gov/system/files/documents/2020/02/06/gps_finalreport618.pdf.

[11/] *See* Petition at 7 ("But a comprehensive public and private effort is necessary to support the deployment of complementary terrestrial PNT solutions in the United States that are reliable and precise enough to mitigate vulnerabilities common to space-based PNT technologies.").

[12/] *See* Executive Order on Strengthening National Resilience Through Responsible Use of Positioning, Navigation, and Timing Services § 4 (Feb. 12, 2020), https://trumpwhitehouse.archives.gov/presidential-actions/executive-order-strengthening-national-resilience-responsible-use-positioning-navigation-timing-services/.

[13/] *See generally* Memorandum on Space Policy, Directive 7 (Jan. 15, 2021), https://trumpwhitehouse.archives.gov/presidential-actions/memorandum-space-policy-directive-7/.

request of the Senate Committee on Armed Services, assessing alternative PNT technologies being developed by DoD.[14/]

Of particular note, the Department of Transportation ("DoT") issued a Complementary PNT Action Plan following the 2018 National Defense Authorization Act and a DoT Report regarding the testing of candidate PNT technologies that could offer complementary PNT services in the event of GPS disruptions.[15/] The Action Plan identifies the steps the DoT will take over the next several years – until 2026 – to, among other things, monitor and support the development of complementary PNT.[16/] As of July 2024, the DoT has awarded more than $7.2 million for the testing and evaluation of complementary PNT technologies.[17/]

A. Complementary PNT Capabilities Must Meet Specific Criteria in Order to Be Truly "Complementary"

The Bureau and OET seek comment on the characteristics and capabilities that are needed for a system to function as a PNT complement to GPS.[18/] As GPSIA has pointed out, there are four primary characteristics that define GPS: signal accuracy, integrity, availability, and continuity.[19/] Accordingly, any system intended to complement GPS should demonstrate all, or

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[14/] *See Technology Assessment: Defense Navigation Capabilities*, Report to the Committee on Armed Services, U.S. Senate, GAO (May 2021), https://www.gao.gov/assets/gao-21-320sp.pdf.

[15/] *See* Complementary PNT Action Plan, U.S. DEPT. OF TRANSPORTATION at 3 (Sept. 2023), https://www.transportation.gov/sites/dot.gov/files/2023-09/DOT%20Complementary%20PNT%20Action%20Plan_Final.pdf.

[16/] *See id.* at 4.

[17/] *See Department of Transportation Awards $7 Million for Complementary Positioning, Navigation and Timing Technologies*, U.S. DEPT. OF TRANSPORTATION (July 3, 2024), https://www.transportation.gov/briefing-room/department-transportation-awards-7-million-complementary-positioning-navigation-and.

[18/] *See Public Notice* at 3.

[19/] *See, e.g.*, GPSIA Oct. 3. 2023 Comments at 5-7, 10; Letter from J. David Grossman, Executive Director, GPSIA, to Marlene H. Dortch, Secretary, FCC, IB Docket Nos. 11-109 and 12-340; IBFS File Nos. SES-MOD20151231-00981; SAT-MOD-20151231- 00090; SAT-MOD-20151231-00091; SATas many of these characteristics as fully as possible. And while there is no single definition of "complementary PNT" that necessarily captures all of these characteristics, GPSIA offers the following description to guide the Commission's consideration of what may be considered a complementary GPS system: any systems, networks, or capabilities that improve the accuracy, integrity, availability, and/or continuity of systems, networks, or capabilities that provide a reference to calculate or augment the calculation of longitude, latitude, altitude, or transmission of time or frequency data, or any combination thereof. Using this metric will aid the Commission in determining whether a proposal will provide complementary PNT service.

In assessing the merits of a complementary PNT system, the Commission should be mindful of the current and planned efforts to provide those services, measuring proposals against what already exists and is expected to be introduced. For example, space-based Wide Area Augmentation System and terrestrially-based atomic clocks and correction services are used today to complement GPS.[20/] The financial industry "often use[s] GPS as a form of confirmation of timing and clock synchronization…the financial industry uses a variety of systems such as atomic clocks as backups in case GPS signals are disrupted."[21/] Real-Time Kinematic Positioning and other correction services reduce positional errors introduced by the atmosphere

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AMD-20180531-00044; SAT-AMD20180531-00045; and SES-AMD20180531-00856 (filed Dec. 20, 2019).

[20/] WAAS is an FAA-managed air navigation aid used to enhance the integrity of the GPS signal, as well as its availability and accuracy. *Satellite Navigation – Wide Area Augmentation System (WAAS)*, FEDERAL AVIATION ADMINISTRATION, https://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/navservices/gnss/waas (last updated Dec. 6, 2023).

[21/] Mason *et al.*, *supra* n. 5, at 67-68.

and variances in satellite positions.[22] They enable key applications, such as centimeter-level positioning used in precision agriculture, surveying, precision construction and mining, and more. Similarly, commercial low earth orbit PNT systems are being developed.[23] And, while no one complementary system will be able to support the needs of all industries and applications, all of these technologies will complement the existing GPS constellation and next generation GPS satellites.

B. Challenges of Relying on a Terrestrial System to Serve as a Backup for GPS

The Bureau and OET seek comment on how a terrestrial PNT system can serve as a "backup" to GPS, including whether the proposed NextNav system is capable of ubiquitous nationwide coverage, including U.S. territories, similar to GPS.[24] While GPSIA appreciates the inquiry, its premise is not accurate. While PNT systems may be complementary to GPS, as discussed above, and may *enhance* its capabilities, none can *replace* GPS as a backup or alternative due to challenges of overcoming availability and continuity requirements. A high-integrity system like GPS requires a high-integrity complement. Some complementary systems may replace certain, but not all, functions that support the characteristics of GPS outlined above.[25] For example, terrestrial based networks may provide location information, but do not offer *continuity* after a period of holdover timing. Similarly, the *integrity* of a substitute system may be insufficient for aviation users. Ubiquitous *availability* – a characteristic that is best provided by space-based systems – may be particularly hard to achieve for any "backup" PNT system. In addition to these limitations, each of these complementary systems currently rely on GPS signals to fully function.

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[22] *See* Stacey Hartmann, *History of RTK – Part 1: A Really Tough Problem to Solve*, AMERICAN SURVEYOR (Apr. 18, 2021), https://amerisurv.com/2021/04/18/history-of-rtk-part-1-a-really-tough-problem-to-solve/.

[23] *See TrustPoint is Awarded Two SpaceWERX Direct-to-Phase II Contracts*, BUSINESSWIRE (Aug. 21, 2024), https://www.businesswire.com/news/home/20240820203837/en/TrustPoint-is-Awarded-Two-SpaceWERX-Direct-to-Phase-II-Contracts.

[24] *See Public Notice* at 3.

[25] *See* Section A, *supra*, for discussion of the primary characteristics of GPS.

While no system can act as a backup to the geographic coverage or range of functions that GPS provides, the Commission may wish to consider other issues as it determines whether any particular complementary PNT should be considered.[26/] Importantly, new signals from complementary PNT capabilities must be integrated into user equipment, receivers, and devices.[27/] Integration can take time, particularly when introducing new capabilities into safety-of-life applications. And while it is possible to demonstrate how particular PNT technologies function, the inherent challenges of developing, operating, and maintaining a system for U.S. and/or global users and customers must also be considered.

And critically, because the characteristics of GPS cannot be duplicated, the Commission should exercise continued vigilance in protecting GPS reception. As GPSIA has noted in the past, by the time that GPS signals reach earth-based receivers they are faint and susceptible to interference from earth-based transmissions.[28/] The Commission must continue to preserve the "quiet neighborhood" in which GPS operates to ensure its ability to provide the critical and unique services it offers.[29/]

[26/] GPSIA reiterates that it offers no opinion on whether NextNav addresses these issues.

[27/] *See The Customer Benefits from Multi-Constellation, Multi-Frequency-Capable, Global Navigation Satellite System Receivers*, GPSIA, https://www.gpsalliance.org/gnss-misconceptions.

[28/] *See, e.g.*, Comments of GPSIA, ET Docket No. 24-209, at 2 (filed Aug. 9, 2024) ("GPSIA Aug. 9, 2024 Comments"); GPSIA Oct. 3, 2023 Comments at 8-9 (discussing the sensitivity of GPS receivers and faintness of GPS signals).

[29/] *See* GPSIA Aug. 9, 2024 Comments at 2; GPSIA Oct. 3, 2023 Comments at 9.

III. CONCLUSION

GPSIA reiterates that it does not endorse nor oppose NextNav's Petition. To the extent that the characteristics of a complementary PNT system are of decisional significance as the Bureau and OET consider how to proceed, they should recognize that no universal terrestrial backup for GPS can exist. PNT systems can complement *aspects* of GPS, not all its essential characteristics. High-integrity systems like GPS require high-integrity complements, and whether a PNT is complementary must be assessed on that basis. That is why the Commission must continue to make assured access to spectrum for GPS a top priority.

Respectfully submitted,

__/s/ *Lisa Dyer*_______

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September 5, 2024

CERTIFICATE OF SERVICE

I, Morgan E. Reeds, hereby certify that on September 5, 2024, a copy of the foregoing Comments was served by electronic mail[1/] on the following:

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*/s/ Morgan E. Reeds*___________________
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[1/] Pursuant to Section 1.47(d) of the FCC's rules, the party to be served may agree to accept service in an alternative form. *See* 47 C.F.R. § 1.47(d). The party listed has agreed to service by electronic mail of these Comments.